

33

calculating a rotation angle λ ;
 scaling said spectrum data by factor Rp^2 ;
 summing said scaled spectrum data;
 storing said scaled spectrum data to a file in memory;
 processing each respective pixel;
 storing said scaled spectrum data in a file in said
 memory; and
 means to output said scaled spectrum data.

34. A method of obtaining X-ray diffraction measure-
 ments using a scanning X-ray diffraction system comprising 10
 the steps of:

- a. emitting X rays;
- b. sweeping said X rays in a predetermined multi-
 dimensional pattern thereby emitting X rays succes- 15
 sively from different positions relative to a specimen
 and to vary the Bragg angle between X rays transmitted
 to and diffracted by the specimen;
- c. positioning an X-ray detector spaced apart from said
 X-ray source for receiving X-rays transmitted to and 20
 diffracted by a specimen, said X-ray detector producing
 an electrical output signal indicative of said diffracted
 X-rays impinging on said detector; and
- d. disposing a X-ray collimator between the specimen and
 said detector, said X-ray collimator placed relatively 25
 close to a specimen as compared to a specimen-to-X-
 ray source distance.

35. The method of obtaining X-ray diffraction measure-
 ments using a scanning X-ray diffraction system as in claim
34 further comprising the step of:

- a. disposing said collimator adjacent to said detector and
 in alignment with said detector thereby causing said
 detector to receive diffracted radiation from the speci- 30
 men.

36. The method of obtaining X-ray diffraction measure- 35
 ments using an X-ray scanning system as in claim **35** further
 comprising the steps of:

- a. sweeping said X-ray source using a processing means
 for correlating the position of the X-ray source with an
 electrical output signal. 40

37. The method of obtaining X-ray diffraction measure-
 ments using an X-ray scanning system as in claim **36** further
 comprising the step of:

- a. counting the signal pulses of said electric output signal. 45

38. The method of obtaining X-ray diffraction measure-
 ments using an X-ray scanning system as in claim **37** further
 comprising the step of:

- a. sorting by wavelength each electric output signal.

39. The method of obtaining X-ray diffraction measure- 50
 ments using an X-ray scanning system as in claim **38** further
 comprising the steps of:

- a. correlating a display with that of said means for
 sweeping said X-ray source and said display having an
 intensity control responsive to said processor means. 55

40. The method of obtaining X-ray diffraction measure-
 ments using an X-ray scanning system as in claim **39**
 wherein said step of sweeping said X-ray source in a
 multi-dimensional pattern comprises sweeping in a 2-D
 sweep relative to a specimen.

34

41. The method of obtaining X-ray diffraction measure-
 ments using an X-ray scanning system as in claim **40**
 wherein said step of sweeping said X-ray source in a
 multi-dimensional pattern comprises sweeping in a 3-D
 sweep. 5

42. The method of obtaining X-ray diffraction measure-
 ments using a scanning X-ray diffraction system as in claim
41 further comprising the step of:

- a. moving said detector to a plurality of positions on a
 spherical geometry; and
- b. aligning diffracted X-rays with said detector at each
 position with a collimator;

said spherical geometry having a specimen at its center
 and said collimator having an axis aligned with a radius
 from said detector.

43. The method of obtaining X-ray diffraction measure-
 ments using a scanning X-ray diffraction system as in claim
42 further comprising the step of:

- a. moving said collimator to a plurality of radial positions
 relative to said detector;
- b. aligning diffracted x-rays with the radiation sensitive
 region of a detector at each position.

44. A scanning X-ray diffraction system for X-ray dif-
 fraction measurements comprising:

- a. an X-ray source;
- b. means for sweeping said X-ray source in a predeter-
 mined multi-dimensional pattern to emit X rays succes-
 sively from different positions relative to a specimen
 and to vary the Bragg angle between X rays transmitted
 to and diffracted by the specimen;
- c. an X-ray detector spaced apart from said X-ray source
 to receive said X rays transmitted to and diffracted by
 the specimen, said X-ray detector having a radiation
 sensitive region and having means for producing an
 electrical output signal indicative of said diffracted X
 rays impinging on said radiation sensitive region of
 said detector;
- d. an X-ray collimator disposed between the specimen
 and said detector, said X-ray collimator, directing X
 rays diffracted by the specimen to said X-ray detector;
 and
- e. means for analyzing said electrical output signal from
 said X-ray detector to determine the wavelength of an
 X-ray photon producing said electrical output signal.

45. The system of claim **44** in which said means for
 analyzing said electrical output signal from said X-ray
 detector comprises a single channel analyzer.

46. The system of claim **44** in which said means for
 analyzing said electrical output signal from said X-ray
 detector comprises a multichannel analyzer.

47. The system of claim **44** in which said means for
 analyzing said electrical output signal from said X-ray
 detector comprises a single event counter.

48. The system of claim **44** in which said means for
 analyzing said electrical output signal from said X-ray
 detector comprises a single rate meter.

* * * * *